

ABSTRACT

This study examines important aspects of the maritime shipping sector in the context of the ongoing low carbon transition that is impacting international transport. In particular, it highlights and explores aspects of the history, development and current condition of maritime insurance governance and practice. In doing so it throws into relief and interprets opportunities for this sphere to play a substantial role in shaping a gradual transition to more sustainable forms of shipping.

The research finds that the mobilization of such activity has a capacity to occur in a significant way through relatively informal governance channels.

Achieving ambitious sustainability objectives will require collaborative effort on behalf of stakeholders throughout the maritime industry utilizing a strategic combination of innovations and advanced practices.

The study aims to examine components of a transition to sustainable shipping by developing a better understanding of how and under what conditions the transition can take place. By exploring ways in which research on sustainable shipping can be integrated with an appraisal of governance, it identifies ways in which maritime stakeholders can initiate actual transition.



Governance, Maritime Insurance and Transition

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Transition; Governance; Maritime insurance; Sustainability; Shipping emissions

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An Industry in Transition

A transition to sustainable shipping has been a key focus of the international maritime industry recently. The ongoing international low carbon transition, which is driven in significant part by the Paris Agreement, suggests that this focus is set to continue and indeed further intensify over time (Muinzer 2020). International shipping activities, which have traditionally relied upon heavy fuel oil as a propulsion fuel, produce large amounts of emissions such as sulphur oxides (SO_x), nitrogen oxides (NO_x), and fine particulate matter (PM_{2.5}), which have been shown to have detrimental health impacts such as increased rates of mortality and morbidity, as well as negative environmental impacts (Corbett et al., 2007; Foretich 2021). It is estimated that in the year 2012, international shipping was accountable for approximately 2.2% of global CO₂ emissions (Poulsen & Sampson 2020; Smith et al. 2014). This figure remains relatively steady at the present time, at an estimated 2.5% approximate figure (UKRI 2021).

Applying renewable and other alternative energy technologies and sustainability strategies for use in maritime transportation is considerably more challenging than doing so with land based transportation scenarios. However, despite these challenges, emerging technological innovations and alternative strategies are being utilized for maritime applications. The suitability of alternative technologies and strategies for maritime applications varies depending on specific characteristics such as vessel size, the intended area of operation as well as the proposed purpose of use of each unique application.

The contemporary maritime industry features numerous emission abatement options that utilize a variety of innovations and technologies. Some existing strategies involve the implementation of abatement technologies such as humid air motor systems, selective catalytic reduction systems, and seawater scrubbers, while other options are aimed at improving energy efficiency such as improved hull design, improved propellers and rudders, and reduced vessel speeds (Cullinane & Cullinane 2013).

Recent efforts to reduce emissions and transition to a sustainable shipping industry include fuel sulphur limits and the designation of sea areas subject to heightened emissions controls, known as Emissions Control Areas (ECAs) (Barregard et al. 2019; Zhang et al. 2021). As a result of directives such as sulphur limits and ECAs, much of the recent emission reduction efforts have focused on less polluting alternative fuel options as a replacement for heavy fuel oil (Boviatsis et al. 2022). One alternative to heavy fuel oil that is increasingly being viewed as a viable less polluting option is liquefied natural gas (LNG), which has the potential to offer an estimated 30% reduction in CO₂ emissions in comparison to the heavy fuel oil status quo (Balcombe et al. 2021; Zhuo & Wang 2022). The use of hydrogen as a source of alternative fuel for the maritime sector has also generated a significant amount of recent interest, and a tremendous amount of research and resources are currently devoted to developing solutions to large scale implementation barriers in areas including infrastructure, production and distribution, etc. (Bicer & Dincer 2018). Due to similarities such as infrastructure and handling requirements, natural gas based fuels, such as LNG, are considered potential complements to the development of the eventual large scale implementation of hydrogen as a sustainable fuel option for the maritime industry (El-Gohary 2013; Mariani et al. 2012).

A commitment by the international shipping sector to emissions reduction and decarbonization is illustrated in the adoption by the International Maritime Organization (IMO) in 2018 of a greenhouse gas (GHG) reduction strategy that aims to achieve a 50% reduction in annual GHG emissions by the year 2050 in comparison to 2008 levels (Stalmokaitė & Hassler 2020). In order

for ambitious emissions reduction targets to be achieved a tremendous amount of collaborative effort on behalf of stakeholders throughout the maritime industry utilizing a strategic combination of innovations and advanced practices will be required.

A Governance Perspective

A useful analysis of components of the transition towards sustainable shipping strategies, such as the replacement of heavy fuel oil as a maritime fuel with less polluting options, can be derived by developing a better understanding of how and under what conditions such a transition could take place with reference to those components. It is also useful to consider who will make decisions that will influence any such transition. A deeper understanding of how and under what conditions a sustainable shipping transition will take place can be better achieved in conjunction with a consideration of maritime governance and the opportunities of principal governance actors to advance such a transition. Similarly, exploring past and current aspects of governance in general and maritime governance more specifically is a useful step in developing an understanding of how a transition towards sustainable shipping can realistically develop and be realized. An understanding of maritime governance can additionally assist environmental and technological researchers focusing on sustainable shipping by presenting the appropriate context surrounding the transition that is being analyzed (Benamara et al., 2019).

Several trends regarding the concept of governance generally, as well as maritime governance in particular, can be observed. In the realm of governance, commercial interests and organizations have often been overlooked in favor of an emphasis on governmental entities rather than private sector actors. However, there is a trend towards the progressively expanding role of non-state organizations in governance, particularly civil society institutions (Weiss et al., 2013). Increased globalization is leading to opportunities for non-state organizations to become involved in ever expanding roles and to exhibit greater influence within the process of governance (Jordan 2008). This trend can be viewed as presenting an opportunity to escalate the role of private interests. Increased globalization has enhanced the opportunity of non-state actors such as nongovernmental organizations (NGOs) and commercial actors to intensify their influence in the governance setting, which is a trend particularly relevant for maritime governance and international shipping.

An important process can therefore be discerned that moves beyond state controlled organizational units implementing collectively binding decisions by recognized governmental authority, towards a model that additionally integrates the influence and participation in the policy formulation process of private and third sector actors within society (Jordan 2008; Treib et al. 2007). Thus, through the use of influence within the policy making process, governance incorporates not only actions of the conventional state, but also additional contributions from factions such as companies and NGOs (Jordan 2008). Here, a consideration of international shipping and maritime governance particularly demonstrates the heightened importance of private interests, with the traditional state being notably less prominent in comparison to other governance domains.

Maritime Governance

While no individual organization or governmental body is singularly responsible for the governance of the sea, maritime governance is substantially managed, though not exclusively, by the IMO. This is the United Nations' specialized agency responsible for issues concerning international shipping. Through the development of an extensive regulatory framework, the IMO's responsibilities cover a broad range of maritime matters, including pollution prevention and safety (Wieslaw 2012). Noted examples of IMO directives and treaties include the 1982 United Nations

Convention on the Law of the Sea (UNCLOS) and the 1973 International Convention for the Prevention of Pollution from Ships (MARPOL) (Batz 2014; Stokke 2013).

Thus, maritime governance is characterized by cooperation and coordination among organizations such as individual state entities at the national level, the European Union at the regional level, and the IMO at the international level. The IMO is able to work closely with individual states and regional organizations to steer policy decisions significantly at each of the state, regional, and international levels.

It is useful to consider contemporary literature on sustainable shipping, which is typically in favor of the utilization of strategies such as the adoption of innovative technologies and the replacement of heavy fuel oil with alternative maritime fuels, in conjunction with governance framing and insights (Young & Kim 2021). A useful task would be to examine ways in which the results presented in the literature and discussions regarding governance can be merged together with practical issues and practices related to the contemporary maritime industry. By exploring ways in which research on sustainable shipping can be integrated with an appraisal of governance, we can identify ways in which the findings of such studies can be used by relevant stakeholders and actors to initiate an actual transition towards objectives such as the replacement of heavy fuel oil as a maritime fuel (Al-Enazi et al., 2021). A domain that offers the ability to achieve such authentic transformations is the practice of maritime insurance.

Maritime Insurance

To gain further insight into how the practice of maritime insurance can serve to contribute to fostering a transition towards sustainable shipping, it will be helpful to examine the fundamental premise of maritime insurance as well as the history behind this vital aspect of the contemporary maritime industry. Despite the associated complexities and related details, at the basic core of the practice of maritime insurance is the concept of a contractual arrangement. Here, a party known as an underwriter is paid an amount of money, described as a premium, for agreeing to take on the maritime associated risks of either a vessel or a cargo, and in some instances both (Kingston 2007). Throughout the long history of maritime insurance, governance and a desire by maritime stakeholders to address genuine dilemmas with practical solutions have played a crucial role in the development of the practice.

The practice known as maritime insurance originated in medieval Italy and as the custom spread from these early beginnings, informal governance mechanisms have led to the evolution of more formal principles (Kingston 2014). For early merchants, just as for traders today, a ship and cargo represented a significant capital commitment that faced numerous risks while at sea such as severe weather conditions, piracy, and capture during times of war, among numerous other perils (Kingston 2014). Due to the danger of these risks, early merchants recognized the need to devise strategies that would serve to minimize their risk exposure. Through this desire, the practice of maritime insurance was born. Fundamental to the practice since the earliest days of its development is the concept of trust between all involved parties. An example of the importance of trust as a fundamental function of maritime insurance can be seen in the lack of formal enforcement mechanisms in early maritime insurance contracts, which relied instead upon the trustworthiness and reputations of the involved parties such as merchants, underwriters and brokers (Kingston 2014). Such practices highlight the role that informal governance among stakeholders has played since the emergence of maritime insurance.

From its origins in medieval Italy, the practice of maritime insurance spread over the centuries to other maritime centers in Europe such as the Netherlands, Spain, France, Great Britain and eventually to other points beyond Europe (Kingston 2014). This gradual westward expansion has comparisons to the 'Westline', which Stopford (2009) characterized as the progressively shifting location of the prominent hub of global maritime commerce throughout history. England saw the

prevalence of maritime insurance contracts increase as a result of the growth of Southampton as an important port city in the fifteenth century, and the practice continued to expand as London flourished as a prominent center of international trade in the sixteenth century (Leonard 2016). Over the following centuries London would continue to develop as the preeminent center of the marine insurance trade, with the acceleration of the practice being identified by John (1958) as one of the most important commercial advances to take place in England during the eighteenth century.

Perhaps the establishment most associated with the early emergence of London as a center for marine insurance during the late seventeenth and early eighteenth century is Edward Lloyd's coffeehouse. After moving to London around 1680, Edward Lloyd opened a coffeehouse which became a gathering place for individuals involved in maritime trading activities, such as merchants, sailors, ship owners and brokers (Behrendt & Solar 2014). As a result of being a gathering place for a network of people concerned with the sea trade, Lloyd's coffeehouse soon developed into a marketplace for maritime insurance (Kingston 2014). Around 1692 Edward Lloyd began to publish a weekly bulletin that reported news such as the arrival and departure times of ships and other useful information targeted towards the maritime stakeholders who frequented his coffeehouse (Behrendt & Solar 2014). These early newsletters were the predecessors to what would become *Lloyd's List*, which remains in publication to this day (Behrendt & Solar 2014). Increased risks at sea as a result of Revolutionary and Napoleonic wars led to a significant demand for maritime insurance, which further facilitated Lloyd's development (Kingston 2007).

Despite the formation of Lloyd's as a maritime insurance marketplace occurring rather informally, as participation in the exchange continued to grow, a need for increased governance mechanisms and oversight gradually arose. In the 1770s, as a result of concerns pertaining to matters such as unethical business practices and open speculation, Lloyd's enacted measures including the formation of a committee responsible for the governance of the exchange, and the passage of a rule restricting entry to individuals who were considered to be of respectable reputation and had purchased an annual subscription (Boyce 2012). In addition to internal governance and self-regulation, over time official government legislation began to be applied to the maritime insurance industry. Merkin et al. (2014) note the Marine Insurance Act of 1745, the Marine Insurance Act of 1788, the Policies of Marine Insurance Act of 1868 and the Marine Insurance Act of 1906 as significant examples of legislative acts that have shaped the British maritime insurance industry.

Over the centuries, both maritime insurance itself and the maritime industry more generally have repeatedly been required to evolve and adapt in response to periodic challenges. Institutions such as Lloyd's of London, the Baltic Exchange, and Lloyd's Register have successfully evolved and responded to challenges while continuing to adhere to long-standing fundamental expectations and practices (Boyce 2012). Classification societies such as Lloyd's Register provide a vital service to the maritime industry by relying on scientific research and data to develop rules and standards for the purpose of ensuring that vessels are seaworthy and fit for their intended uses (Miller 1997). The ability of these key stakeholder institutions to adapt to challenges over the years has allowed the maritime industry to maintain a level of confidence that has proved vital to the continued success of the industry.

In the late twentieth century several events occurred that led maritime insurance as well as the broader maritime industry to become more proactive in addressing issues related to pollution and environmental protection. Heij and Knapp (2012) note that as a result of notable tanker accidents, the IMO began to focus on legislation aimed at safety and environmental protection during the 1970s. Following the devastating *Torrey Canyon* shipwreck and oil spill in 1967 off the coast of England, the IMO commenced efforts to enact compulsory liability insurance requirements (Zhu 2014). Comparably, the issue of marine liability coverage, and protection and indemnity clubs, which provide such coverage for over 90% of the world merchant fleet, gained significantly increased public notoriety following the 1989 *Exxon Valdez* oil spill disaster (Ronneberg 1990).

Protection and indemnity clubs are organizations consisting of a group of ship owners, formed for the purpose of mutually protecting members against liabilities associated with maritime operations (Clark 1980). Protection and indemnity clubs evolved from early maritime insurance, as the need arose for protection beyond that of hull and cargo coverage, as a means for providing protection against third party liability claims (Cooney 1993). The coverage provided by protection and indemnity clubs is particularly important in the event of accidents resulting in environmental damage, such as oil spills (Clark 1980; Cooney 1993).

Initiating Transition

This brief inspection of maritime insurance exposes a variety of concepts that have remained present within the practice throughout the centuries, and that certainly have relevance for the present in relation to the prospect of a transition to sustainable shipping. The first is the use of informal governance as opposed to official government legislation that has so often been utilized throughout the history of maritime insurance to enact reform within the practice (and indeed beyond it in the context of the wider maritime industry). This lesson offers a guide for ways in which governance actions on behalf of the marine insurance market can help initiate changes within the maritime industry in the absence of more formalized legislation being enacted by states or equivalent representative bodies. As a practice that is crucial to the continual operation of the global maritime industry and one that by design is intended to operate in the best interest of the stakeholders involved, the maritime insurance market is uniquely positioned to enact change.

An interesting example of a case where the maritime insurance market is uniquely positioned to enact transition is that of the Arctic region. The Arctic region plays a tremendously important role in the Earth's climate system. Therefore, environmental protection within the Arctic region is of paramount importance. However, the region is characterized by complex governance conditions in which actors such as the Arctic Council play significant governance roles yet lack legislative authority. This can render proposed regulatory efforts, such as a heavy fuel oil ban within the Arctic region, a challenge to implement (Young & Kim 2021). Studies such as Laribi and Guy (2020) and Jing et al. (2021) suggest that it is in the best interests of the Arctic region to embrace a transition away from heavy fuel oil towards alternatives such as LNG as a marine fuel.

Maritime insurance and associated fields can help enact this transition. Through the use of informal governance, in lieu of formal legislation, the marine insurance marketplace along with institutions such as classification societies can take actions that will help instigate a transition away from heavy fuel oil towards more preferable options such as LNG or hydrogen for ships wishing to conduct operations within the Arctic region. Based on research findings, classification societies could determine that it is necessary to update the requirements and standards for ships wishing to be deemed suitable for operating in Arctic waters. Revised classification society standards of this nature could effectively exclude ships that run on heavy fuel oil from operating within the Arctic region. Through such actions, classification societies would in effect be able to impose a transition within the Arctic regardless of legislative actions or the lack thereof.

Furthermore, stakeholders engaged in the maritime insurance marketplace might be convinced by research findings that it is in their best interests to require vessels wishing to be insured for maritime operations within the Arctic region to utilize a more preferable alternative to heavy fuel oil, such as LNG or hydrogen. If so, the insurance marketplace would be able to initiate a transition away from heavy fuel oil towards preferable alternatives to take place in the Arctic region independently without having to rely on the enactment of formal legislation. In doing so, the insurance marketplace would also in essence be providing some consistency to maritime governance within the Arctic region. It has been argued that consistency is a feature that is lacking in regard to the regulation of shipping emissions within the Arctic region (Chircop 2020).

A recent example of maritime governance stakeholders, including actors associated with the maritime insurance industry, successfully working together to promote positive change in the Arctic region is the development of the International Code for Ships Operating in Polar Waters, also known as the Polar Code. Adopted by the IMO in 2014 and entering into force in 2017, the Polar Code addresses issues such as vessel design, construction and equipment, search and rescue procedures, training and environmental protection, and focuses on specific risks associated with operating in Arctic and Antarctic waters (Han 2018; Jabour 2014). The Polar Code provides a useful framework for maritime insurance underwriters evaluating the risks associated with vessel operations in the Polar regions and demonstrates collaborative efforts by maritime governance actors to initiate meaningful change (Lloyd's 2017; Fedi et al. 2018; Mukherjee & Liu 2018).

Another constant theme throughout the history of the practice of maritime insurance is the importance of information to the field and how such information is relied upon and utilized by stakeholders in order to maintain confidence in the maritime industry. Examples over time of the industry relying on information associated with maritime insurance range from the early newsletters distributed at Edward Lloyd's coffeehouse, to the work of modern classification societies. Just as the maritime insurance industry has relied on the review and dissemination of important and relevant information to make decisions and safeguard the interests of stakeholders throughout history, so too would the industry welcome the use of information such as the results and findings of research on decarbonization strategies and a transition to sustainable shipping.

Information and data from contemporary research are indispensably useful to the maritime industry today and are the latest examples of how information has been vital to the industry throughout history (Lind et al., 2021). As research enables the maritime industry to have a better understanding of the concerns and challenges that face it, it allows industry stakeholders to be able to better craft strategies designed to address such challenges in the future. As issues such as emissions from shipping activities become better understood, industry stakeholders are increasingly better able to design strategies and policies to adequately address these issues in the future. Under the current prospect of heightened international shipping activity taking place over the near future, research findings are of vital importance for stakeholders, including those in particular who operate in the maritime insurance marketplace in a direct or associated way.

Another constant aspect of marine insurance throughout history is the vital reliance on trust. In order for the practice of marine insurance to successfully function, there must exist an underlying appreciation of trust and confidence between all involved parties and associated stakeholders. This foundation of trust and confidence is a vital principle that maritime insurance and the broader maritime industry that it supports relies upon. In order for this trust to be maintained, all involved parties must be able to have confidence that each faction is acting in good faith, relying on honest and accurate information, and acting in a manner that considers any risks to safety of not only the involved parties but also any risks to society at large (Zhu 2020).

Recent research findings suggest that society will be better off if a transition to sustainable shipping is achieved in a timely and efficient manner (Bademo et al., 2022). Based on these findings, it can be argued that stakeholders involved in international shipping, such as the maritime insurance marketplace and associated parties such as classification societies, would also conclude that society as a whole would be better off as a result of adopting sustainable shipping strategies. If so, it would be reasonable to assume that in order to preserve the foundation of trust and confidence that the maritime insurance marketplace and the wider maritime industry has relied upon over the centuries, stakeholders would likewise embrace such a transition towards a sustainable future for the industry. By advocating for a transition towards sustainable shipping, stakeholders would be maintaining the long held foundation of trust and confidence while working together to consider and mitigate not only risks to parties actively involved in the maritime industry but also society at large.

Conclusions

This study has recognized that the world is undergoing a gradual transition to sustainable forms of transport. Given its significant contribution to global emissions, the international shipping sector will not be left behind in this process. This study has found that stakeholders in the marine marketplace have opportunities to help drive the transition in this sector through the adoption of sustainable shipping strategies and practices, particularly in (but not limited to) the maritime insurance space. Importantly, it has found that these opportunities can be operationalized in principle through relatively informal channels of governance.

The study encourages the recognition and mobilization of these capacities for action in the interest of assisting stakeholders in the sector to benefit financially from green opportunities. It also encourages the mobilization of these capacities in order to aid the maritime industry in moving to a position where it can gradually become a leader in the ongoing global transport transition, in order for the sector to be better equipped for the evolving challenges provided by an increasingly low-carbon world. Furthermore, and crucially, such approaches are beneficial for the purposes of good environmental governance.

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